VEHICLE SEAT WITH FOLD-FLAT POSITION

BACKGROUND OF THE INVENTION

The present invention relates to a vehicle seat, in particular an automobile seat, having a fitting that is operative so that a backrest of the seat can be folding about an axis of rotation between a use position, in which a user can occupy the seat, and a fold-flat position.

In a vehicle seat, with a backrest that is arranged by means of hinge fittings on the substructure of the seat and is foldable to a flat position, a backrest compensation spring is used for balancing the weight of the backrest and, if need be, of the passenger. This spring is disclosed, for example, in DE 38 37 665 A1, in the form of a spiral spring. The backrest compensation spring may also be a torsion spring. In the case of vehicle seats with a fold-flat function, which permits folding the backrest forward to a substantially horizontal position, the rotation axis of the backrest must be arranged relatively high. This prevents a use of the known backrest compensation springs for reasons of rebound space.

BRIEF SUMMARY OF SOME ASPECTS OF THE INVENTION

An aspect of the present invention is the provision of an improvement to a vehicle seat having a backrest which can be folding about an axis of rotation between a use position, in which a user can occupy the seat, and a fold-flat position. In accordance with this aspect, the improvement relates to compensating for the weight of the backrest. In accordance with this aspect, a vehicle seat, in particular an automobile seat, has a seat substructure, a backrest

structure, and at least one fitting. The fitting includes first and second fitting members, and the first fitting member is rotatable relative to the second fitting member about an axis of rotation. The first fitting member is secured to the backrest structure, and the second fitting member is secured to the seat substructure. The fitting is operative so that the backrest can be folded about the axis of rotation between at least one use position and a fold-flat position. A compensation spring is secured to the seat substructure and is operatively connected to the backrest structure via a movable linkage.

As a result of operatively connecting to the backrest structure, by means of a linkage, a compensation spring that is secured to the seat substructure, it becomes possible to overcome with the linkage the height difference between the axis of rotation and the substructure of the seat, and to transmit the compensation action of the compensation spring to the backrest. For a defined movement of the linkage, it preferably comprises interconnected components, such as levers, links, and connection bars. Angular shapes make it possible to achieve directional deflections.

Preferably, the compensation spring has a minimal bias in an intermediate position of the backrest between its use position and its fold-flat position, so that it cushions both during a transition to the use position and during a transition to the fold-flat position. This keeps the loads on the fitting especially small. The intermediate position constitutes a stable minimum for the backrest. Preferably, the linkage has a dead center in an intermediate position of the backrest between the

position of use and the fold-flat position, which preferably corresponds to the intermediate position of the minimal bias of the compensation spring. The dead center separates the different directions and angles of transmission of the compensation effect, which are optimized for the transition to the use position on the one hand and to the fold-flat position on the other hand. In a preferred embodiment, the extension line of the connection bar intersects the axis of rotation in the dead center configuration (i.e., the connection bar and, therefore, the linkage, exerts no torque on fitting during the dead center configuration).

BRIEF DESCRIPTION OF THE DRAWINGS

In the following, the invention is described in greater detail with reference to an embodiment illustrated in the drawings, in which:

Figure 1 is a side view of the embodiment in its use position;

Figure 2 is a corresponding side view during a transition to the fold-flat position, wherein the backrest occupies an intermediate position; and

Figure 3 is a corresponding side view in the fold-flat position.

DETAILED DESCRIPTION OF THE INVENTION

The present invention now will be described more fully hereinafter with reference to the accompanying drawings, in which some, but not all embodiments of the invention are shown. Indeed, the invention may be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will satisfy applicable legal

requirements. Like numbers refer to like elements throughout.

A vehicle seat **1** is provided for a rear, i.e., second or third, seat row in a vehicle. A seat substructure **3** mounts a seat cushion **5**, which is illustrated by broken lines in the drawings. There are two fittings **7**, which are respectively arranged on each side of the vehicle seat. Each fitting **7** is constructed as a hinge fitting or a gear-operated fitting with a free-swing function. Each fitting **7** comprises a first fitting member **8** and a second fitting member **9**, which can be rotated relative to each other and be locked in position with respect to one another. The two fittings **7** can be synchronously disengaged via a transmission bar (not shown) which extends between the fittings. Each first fitting member **8** is rigidly mounted to a backrest structure **10** of a backrest **12**. Each second fitting member **9** is secured to the upward extending rear end region of the seat substructure **3**. An axis of rotation **14** of the fitting **7** forms the axis of rotation of the backrest **12**.

The first fitting member **8** mounts a backrest attachment element **16**, which curves in concentric relationship about the axis of rotation **14**. Connected to the backrest attachment element **16** with its one end is a connecting bar **20**, whose other end is connected to a link **22**. The link **22** is mounted for rotation to the seat substructure **3** by means of a bearing pin **24**. The link **22** has an angular shape, with the connecting bar **20** being connected to the link **22** in the region of the tip of the link **22**. The bearing pin **24** is arranged at the end of one leg of the link **22**. Attached to the end of the other leg of the link **22** is a compensation spring **26** which engages (e.g., is mounted to) the seat

substructure **3** with its other, forward directed end. The compensation spring **26** is preferably in the form of a tension spring. The biased compensation spring **26** that is secured to the seat substructure extends approximately horizontally and along the seat substructure **3**. The backrest attachment element **16**, the connecting bar **20**, and the link **22** form a movable linkage **28**, which operatively connects the compensation spring **26** to the backrest structure **10**.

By means of disengaging and pivoting the fittings **7**, the inclination-adjustable backrest **12** is able to occupy different positions of use, which are suitable for sitting. In this case, the backrest **12** is inclined relative the vertical in different positions toward the back, when viewed in the traveling direction, for example, by about 23° in the so-called design position. After disengaging the fitting **7**, the backrest **12** may also be folded forward to a flat position. In this instance, the backside of the backrest **12** is arranged substantially horizontally and faces upward.

The linkage **28** is designed such that it occupies a dead center in an intermediate position of the backrest **12** between the positions in use and the fold-flat position. In this dead center, the connecting bar **20** extends perpendicularly to the backrest attachment element **16**, i.e., the extension line of the radially projecting connecting bar **20** intersects the axis of rotation **14**. In this instance, the compensation spring **26** has its smallest bias. From this intermediate position, the compensation spring **26** tensions in both directions to a greater extent, i.e., it cushions both toward the positions in use and the fold-flat position. Consequently, when the backrest **12** approaches one of these positions, a load on the fitting **7** by the weight

of the backrest **12** will be avoided, thereby preventing damage of the fitting 7 during an engagement.

Many modifications and other embodiments of the inventions set forth herein will come to mind to one skilled in the art to which these inventions pertain having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the inventions are not to be limited to the specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of the appended claims. Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.